

1. Simplify each of these expressions:

(a) $\frac{x^2 + 3x}{x^2 - 9}$

(b) $\frac{2t^2 - 3t + 1}{6t^2 - 3t}$

(c) $(x-1)(x^2 - x - 1)$

2. By first factorising numerator and denominator, simplify each of these fractions:

(a) $\frac{3x+6}{x^2-4}$

(b) $\frac{a^2 - a - 6}{2a^2 - 5a - 3}$

(c) $\frac{x+7}{x^2+6x-7}$

3. Simplify each of these expressions:

(a) $\frac{1}{x} + \frac{2}{3x}$

(b) $\frac{1}{x} + \frac{1}{x+1}$

(c) $\frac{1}{x} - \frac{1}{3x}$

4. Factorise:

(a) $2x^2 - x - 1$

(b) $3x^2 - 5x + 2$

(c) $25 - x^2$

(d) $5x^2 - 45$

(e) $2x^2 - 4x + 2$

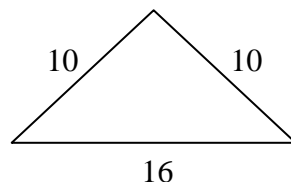
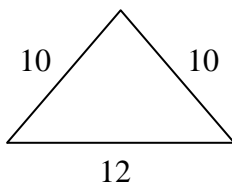
(f) $1 + x - 2x^2$

5. (a) Express $x^2 + 8x + 11$ in the form $x + a^2 + b$.

(b) Express $x^2 - 4x + 13$ in the form $x + a^2 + b$.

(c) Express $x^2 + x + 1$ in the form $x + a^2 + b$.

6. Which of these triangles has the greater area? Show all working.



7. The volume of a cube is 8 cubic centimetres. Find its total surface area.
8. The surface area of a cube is 96 square centimetres. Find its volume.
9. A coffee shop blends its own coffee and sells it in one-kilogram tins.
One blend consists of two kinds of coffee, Brazilian and Colombian, in the ratio 2 : 3.
The shop has 20 kilograms of Brazilian and 25 kilograms of Colombian in stock.
What is the MAXIMUM number of one-kilogram tins of this blend which can be made?

10. Evaluate (non-calculator):

(a) $7 \cdot 18 - 2 \cdot 1 \times 3$

(b) $1\frac{1}{8} \div \frac{3}{4}$

(c) $\sqrt{18 + \sqrt{49}}$

11. A grocer buys 14 boxes of apples at £16.36 per box. He sells 12 boxes at £20.25 per box and the other 2 remain unsold.

Find his total profit as a percentage of the cost price.

12. The hypotenuse of an isosceles right-angled triangle measures 26 cm.

Calculate the perimeter of the triangle.

13. Simplify

(a) $\frac{x^{-2} \times x^4}{x^{-1}}$

(b) $\frac{y^{\frac{1}{2}} y^{\frac{3}{2}} + y^{-\frac{1}{2}}}{y}$

14. Remove brackets and simplify:

(a) $(2x+3)(x-1) - 4x$

(b) $(3-y)(2-y) + 3(1-y)$ (c)

$(x+4)(2x^2+3x-1)$

(d) $(x-3)(x^2+5x-2)$